

Pensieve header: A draft permutations package for March 28, 2016.

```

BeginPackage["Permutations`"]
Permutations`

PP::usage = "PP[a,b,...] gives the product of the permutations a,b,...";
IP::usage = "IP[a] gives the inverse permutation of a.";
PS::usage = "PS[a] gives the support of the
    permutation a (its domain, minus the set of its fixed points).";
PR::usage = "PR[expr, a] applies the permutation a to
    all integers appearing in expr.";

Begin["`Private`"]
Permutations`Private`

PP[a_List] := a;
PP[a_List, b_List] := b[[a]];
PP[a_List, rest_List] := PP[a, PP@rest];

Exercise: Can you reduce the above to just two lines?

IP[a_List] := (t = 0 a; Do[t[[a[[i]]] = i, {i, Length@a}]; t)
PS[a_] := Select[a, # != a[[#]] &]
PR[expr_, a_List] := expr /. Table[i -> a[[i]], {i, a}]
PR[expr_, a_List] := expr /. Thread[a -> a[[a]]]

End[]; EndPackage[]

```

To do

? PermutationList

PermutationList[perm] returns a permutation list representation of permutation perm.

PermutationList[perm, len] returns a permutation list of length len. >>

? PermutationCycles

PermutationCycles[perm] gives a disjoint cycle representation of permutation perm. >>

? Permutation

Information::notfound: Symbol Permutation not found. >>

Use the head "Permutation" to represent permutations!

Use old operation names "PermutationProduct", "InversePermutation", "PermutationSupport", "PermutationReplace"!

Allow mixing old and new notations!